ESTIMATE OF GRID INVESTMENT IMPACT

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SYSTEMIQ

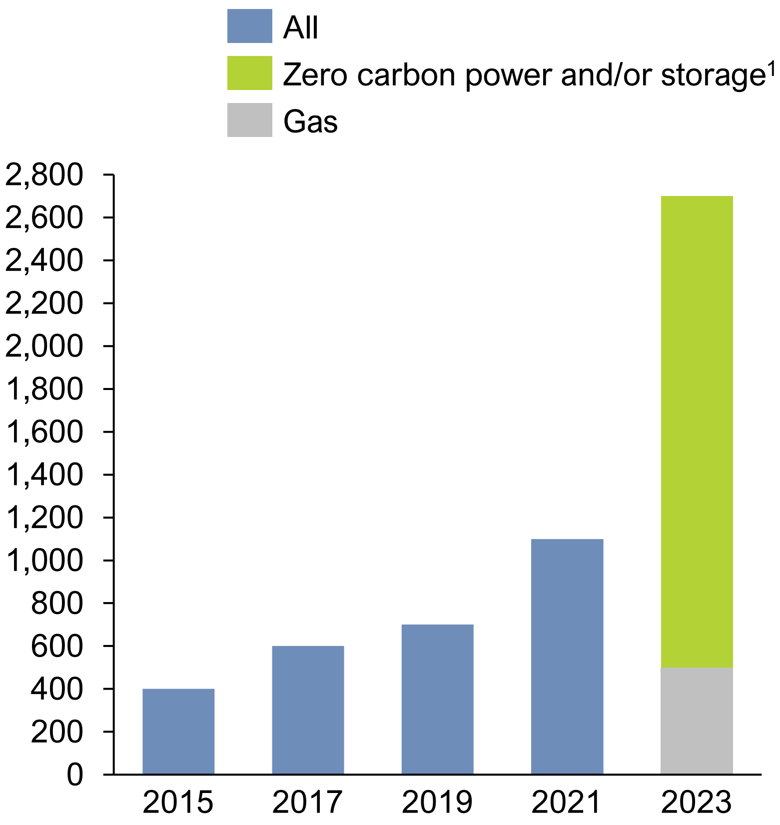
EXECUTIVE SUMMARY

1. Electricity grids have a **foundational role in enabling the energy transition:** both direct and indirect electrification represent the single largest lever for decarbonisation across buildings, transport, and industry, and this depends on the availability of grid infrastructure.
2. To enable the energy transition, electricity grids need to grow 2-3x in length**.** However, the required growth faces various headwinds, including **increasing competition for public budgets, and a strong economic impact case would support further grid investments**.
3. A standard way to **evaluate the economic impacts of infrastructure investments is measuring Gross Value Added** (GVA multipliers):
    1. The projected electricity grid growth investment could generate **$1.1–3.2 trillion in GVA globally per annum** between now and 2050
    2. Compared to other infrastructure investments, **electricity grid economic multiplier impacts are on a par with critical infrastructure** such as roads, railways and other energy investments.
4. **Although GVA captures short-term economic output impacts, grid investments also deliver a wider range of benefits** — including regional and national economic development, long-term cost savings for both the system and end users, system resilience and system security, enhanced well-being, and environmental sustainability.
5. **There is no holistic and consistent approach to measuring the benefits of grids**. **Fully valuing the benefits of grids will enable public investment decisions to be made on a more informed basis**.
6. **We would recommend develop a more comprehensive approach to evaluating grid investments.** A range of approaches already exist from valuing the lost investment from renewables projects that are stuck in the interconnection queue, to the increase in business formation that results that previously disconnected regions and connected to the grid. It would be beneficial for studies by governments, grid operators, or research organisations to quantify these benefits, and in doing so – move towards a methodological best practice.

1. FAILURE TO INVEST IN GRIDS IN A TIMELY MANNER RISKS SERIOUS ECONOMIC AND CLIMATE CONSEQUENCES

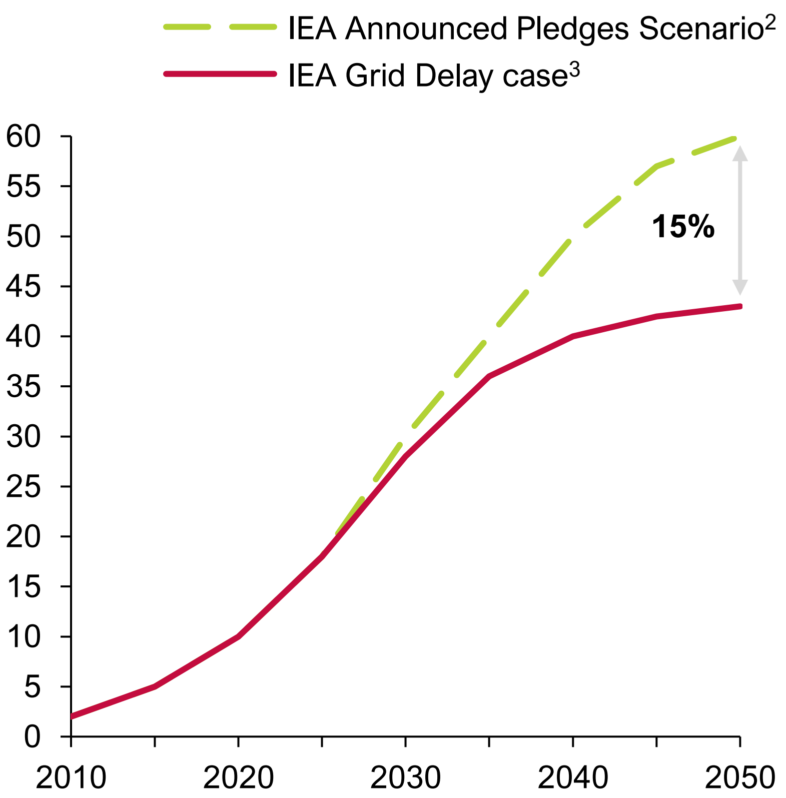
A growing no. of renewables projects, are in the grid queue and cannot be built…

US grid connection queue size, GW



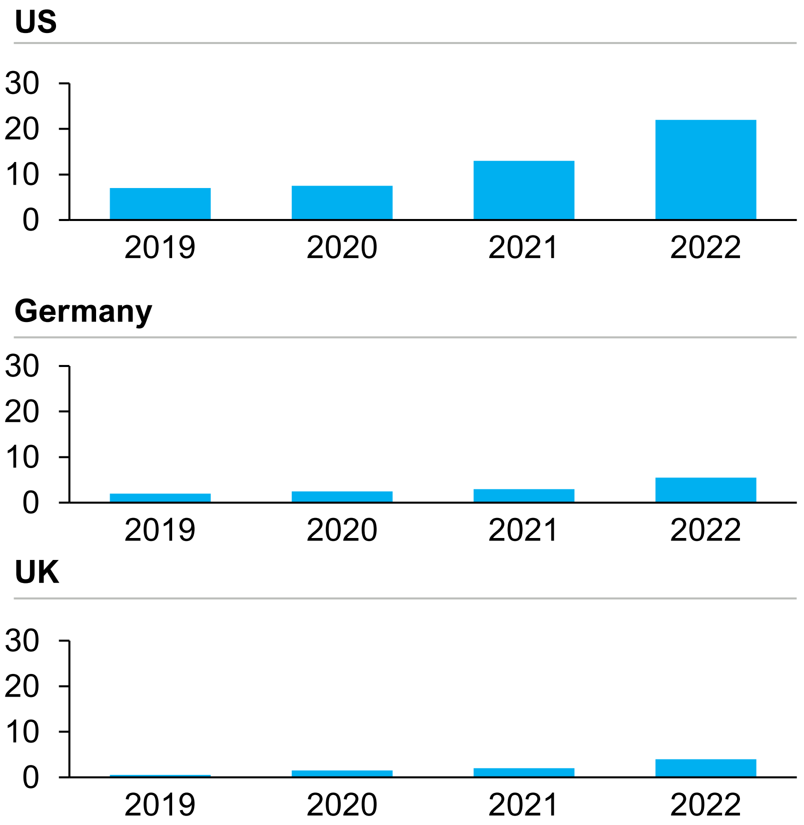
…This lack of grid capacity is a major risk to the energy transition…

Share of solar PV and wind in global power generation, %



…And is already generating significant costs

Annual transmission grid congestion cost estimates[4], $ bn



Note: 1. Including nuclear and battery projects. | 2. Announced Pledges scenario (APS) shows the pathway corresponding with announced ambitions and targets, including all national announcements as of September 2022. | 3. The Grid Delay case is a variation on the APS showing a scenario where there is failure to modernise existing infrastructure and deliver new grid infrastructure in a timely manner. | 4. Costs are the difference between what consumers pay and what generators would be paid in an unconstrained grid.
Source: Energy Transitions Commission (2024) *Building grids faster: the backbone of the energy transition*.

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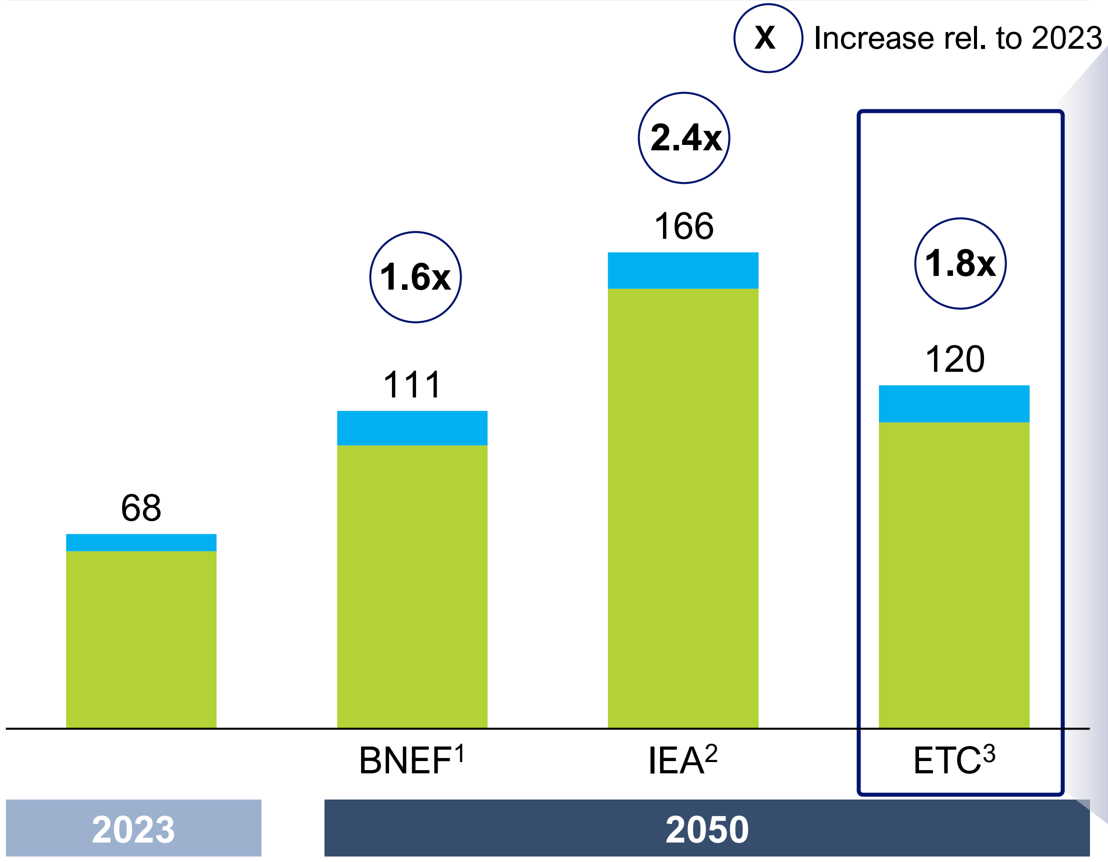
2. TO MEET FUTURE DEMAND, ELECTRICITY GRIDS WILL NEED TO INCREASE DRASTICALLY ACROSS REGIONS

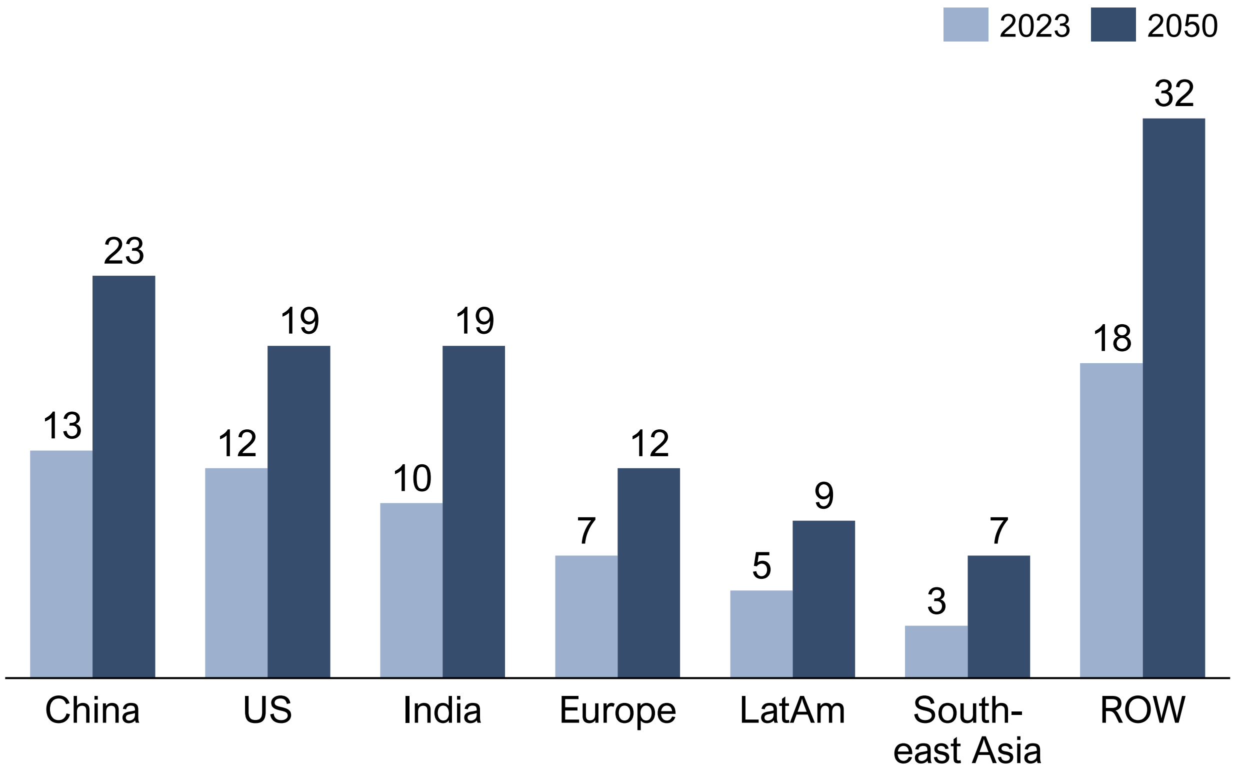
The required increase in global grids to reach net zero ranges from 1.6x to 2.4x between now and 2050

Estimated wires required under different forecasts, mn km



Significant increases in grid size are required across regions to reach net zero

Estimated wires required under ETC projection, mn km



Note: 1. Net Zero Scenario from 2024 New Energy Outlook. | 2. IEA Announced Pledges Scenario (APS) from Electricity Grids paper. | 3. Average of Accelerated but Clearly Feasible (ACF) scenario and Possible But Stretching (PBS) scenarios first outlined in ETC Fossil Fuels report.

Source: Bloomberg New Energy Finance (2024) *New Energy Outlook 2024*; IEA (2023) *Electricity Grids and Secure Energy Transitions;* Energy Transitions Commission (2024) *Building grids faster: the backbone of the energy transition*.

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3.1. ELECTRICITY GRID GVA MULTIPLIER ESTIMATES RANGE FROM 0.4-2.4

GVA: value of goods and services produced minus the value of intermediate inputs

GVA is one measure used to measure short-term multipliers, along with GDP, income and employment multipliers can also be used

There are three of multiplier effects:

- **Direct effects:** labour and material spending in the industries directly impacted by local spending
- **Indirect effects:** created by spending of supporting industries that supply material and services
- **Induced effects:** result of workers´ spending in good and services whose earnings have been affected by the direct local spending

Direct | Indirect | Induced | Total

Study	Year	Geographical scope	% share of local spend	GVA impact multiplier, $ per $1 invested	Employment impact, job-years per $1 M investment
Enel	2024	Italy	*N/A*	2.2	28.3[1]
Biggar Economics and SSEN	2023	UK	60%	0.7	10.1
WIRES and London Economics	2021	US	*Varies by project stage*	0.5	5.4[2]
Brown, Sony and Li	2020	US	*N/A*		5.7
London Economics	2018	US – California, Nevada, Utah, Wyoming	40%	0.4	9-12[3]
WIRES and Brattle	2011	US	82%	2.4	12.7[4]
Orkney Islands Council	2021	Scotland	45%	Alternate metric: *GVA impact in $1 M per km*: **1.1**[5]	
Xu, Das, Guo and Wei	2021 (based on 1998-2017)	China - 30 provinces	*N/A*	Alternate metric: GVA impact from 1% increase in grid infrastructure stock: **0.39%**	
			Total range		

Note: 1. Assumed that number in study refers to job-years. | 2. This is for jobs, not job-years. | 3. Based on dividing 53.1 by 67 km cable length (14 km onshore and 53 km subsea). | 4. Assume 50-50 split between indirect and induced (not disaggregated in study). | 5. Based on dividing 53.1 by 67 km cable length (14 km onshore and 53 km subsea). | Impact of National Grid Great Grid Upgrade is not included as GVA figures are available, but investment costs of all projects is not available.

Source: Enel (2024) *The Role of Electricity Distribution for a Safe Energy Transition;* SSEN (2023) *Economic Impact of SSEN Transmission's capital investment programme*; London Economics (2021) *Repowering America: Transmission investment for economic stimulus and climate change*; Brown, Sony and Li (2020) *Estimating employment from energy-efficiency investments*; London Economics (2018) *Estimating Macroeconomic Benefits of Transmission Investment with the REMI Pi+ model;* The Brattle Group (2011) *Employment and Economic Benefits of Transmission Infrastructure Investment in the U.S. and Canada*; Orkney Islands Council (2021) *A transmission link for Orkney: An impact analysis on the Orkney economy*; Xu, Das, Guo and Wei (2021) *Does power grid infrastructure stimulate regional economic growth?*

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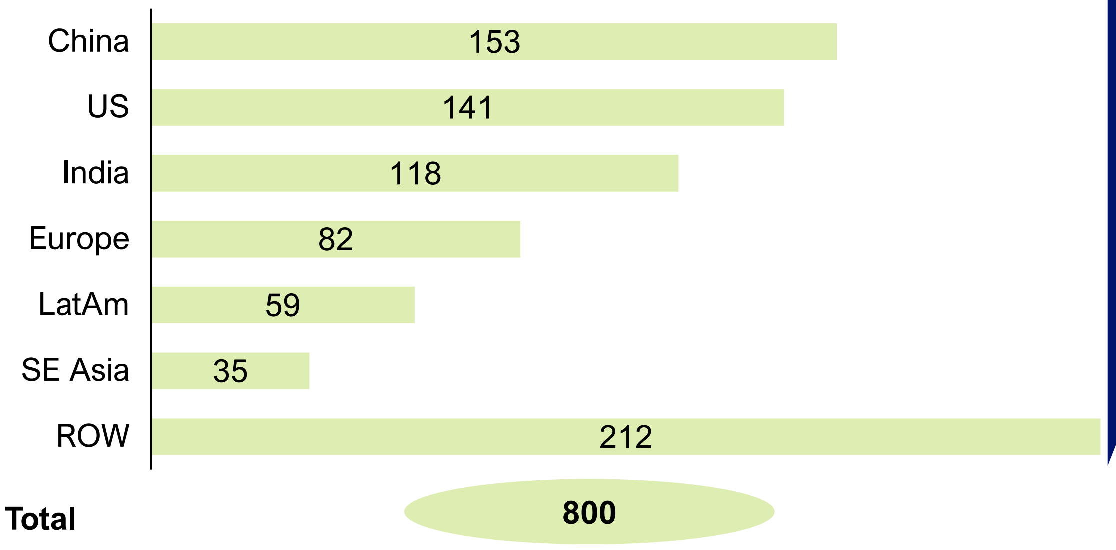
3.1. APPLYING GVA MULTIPLIER ESTIMATES INDICATES ELECTRICITY GRID INVESTMENTS COULD GENERATE AN ANNUAL GVA IMPACT OF $1.1 – 3.2 TN

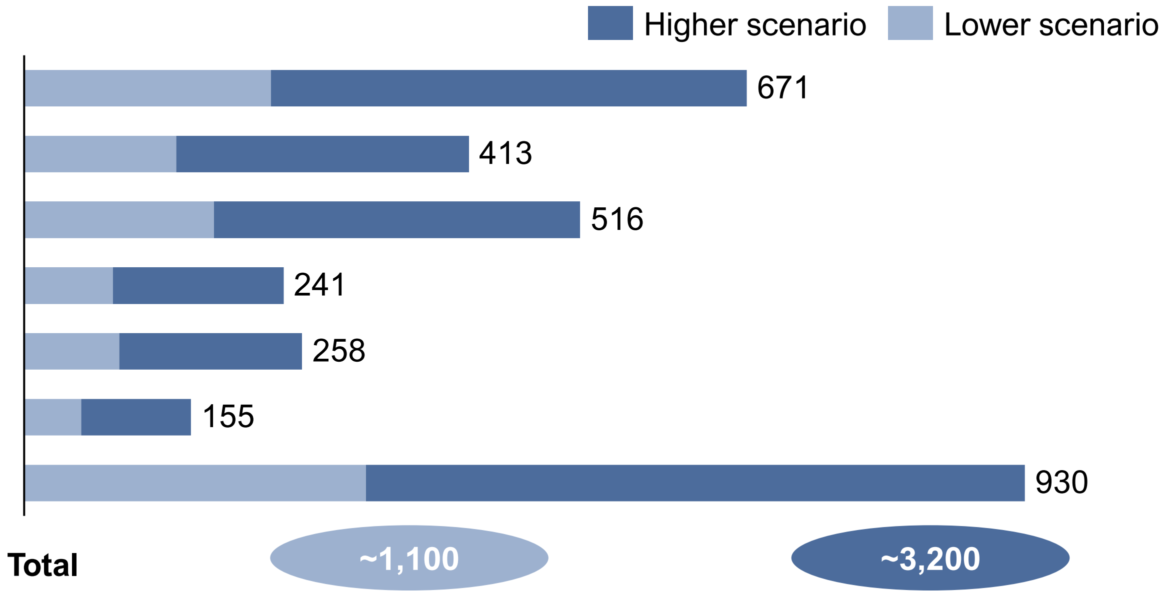
An average annual global investment in grids of ~$800 BN is required to meet net zero

Global annual average investment in transmission & distribution 2021-50 to meet net zero, bn USD[1]



This translates into a global annual GVA impact of $1.1 – 3.2 TN

Calculated GVA impact, bn USD



Method: Multipliers of 0.4 for low scenario and 2.4 for high scenario (range of studies shown on previous page) were corrected. Correction is required as multiplier estimation studies assume a % is spent locally whilst the rest is spent in other economies (leakages), but at the global level there are no leakages. Corrected multipliers of 1 and 2.9 were then adjusted using a developing country/ developed country ratio of 1.5, based on an IMF study.

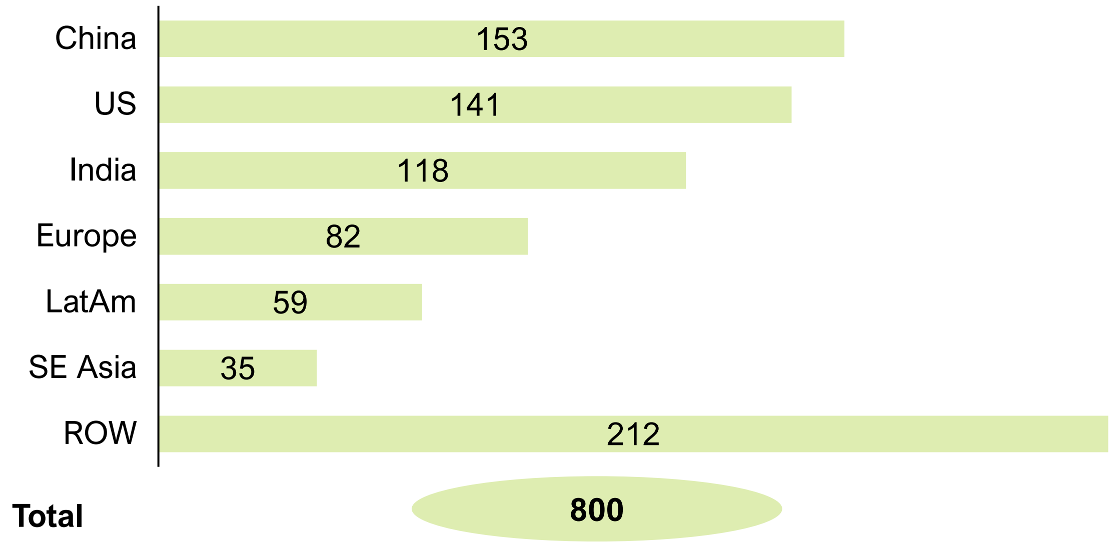
Note: 1. Based on applying regional breakdown in km required in ETC report to overall T&D spend requirement of $80B per annum.

Source: Energy Transitions Commission (2024) *Building grids faster: the backbone of the energy transition;* London Economics (2018) *Estimating Macroeconomic Benefits of Transmission Investment with the REMI Pi+ model;* The Brattle Group (2011) *Employment and Economic Benefits of Transmission Infrastructure Investment in the U.S. and Canada*; IMF (2019) *Is the Public Investment Multiplier Higher in Developing Countries? An Empirical Exploration*.

3.1. APPLYING A WEIGHTED GVA MULTIPLIER INDICATES ELECTRICITY GRID INVESTMENTS COULD GENERATE AN ANNUAL GVA IMPACT OF ~$1.2 TN

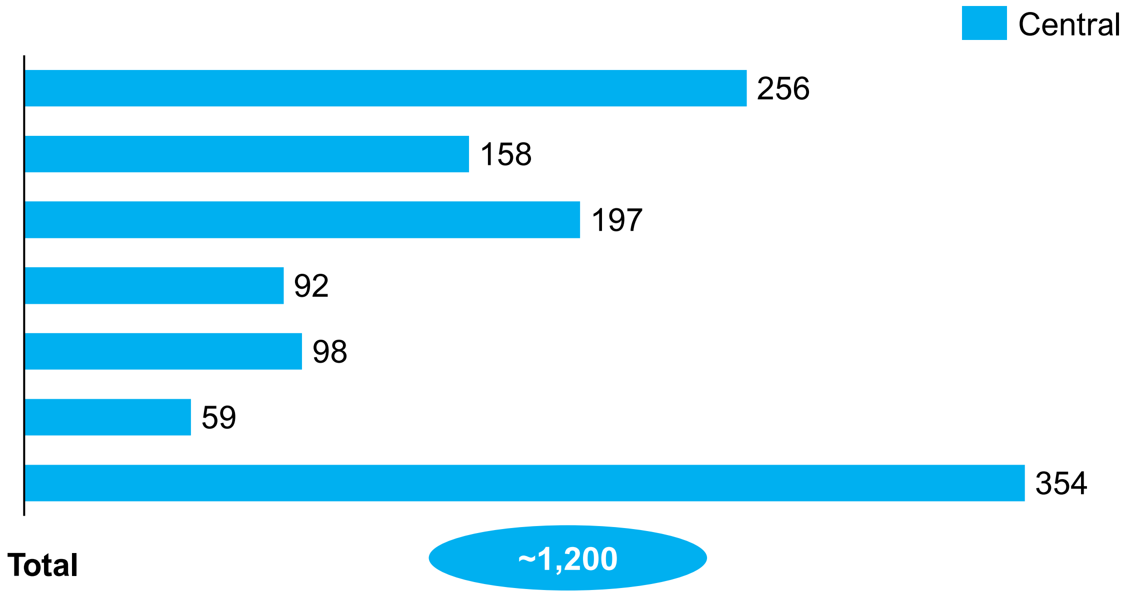
An average annual global investment in grids of ~$800 BN is required to meet net zero

Global annual average investment in transmission & distribution 2021-50 to meet net zero, bn USD[1]



This translates into a global annual GVA impact of ~1.2 TN

Calculated GVA impact, bn USD



Method: Multipliers on previous page were weighted by each country's share of overall power demand, leading to a weighted multiplier of 1.1. Corrected multipliers were then adjusted using a developing country/ developed country ratio of 1.5, based on an IMF study.

Note: 1. Based on applying regional breakdown in km required in ETC report to overall T&D spend requirement of $80B per annum.

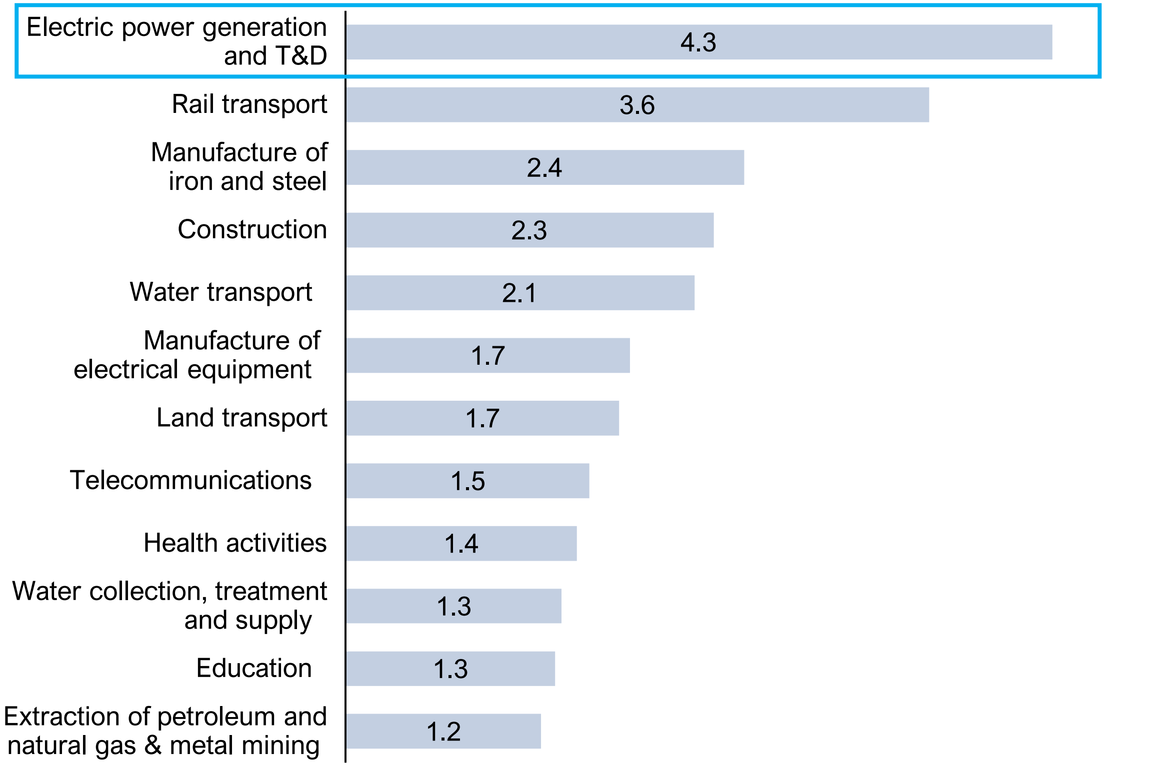
Source: Energy Transitions Commission (2024) *Building grids faster: the backbone of the energy transition;* London Economics (2018) *Estimating Macroeconomic Benefits of Transmission Investment with the REMI Pi+ model;* The Brattle Group (2011) *Employment and Economic Benefits of Transmission Infrastructure Investment in the U.S. and Canada*; IMF (2019) *Is the Public Investment Multiplier Higher in Developing Countries? An Empirical Exploration*.

3.2. ELECTRICITY GENERATION AND TRANSMISSION GVA MULTIPLIERS ARE ROUGHLY ON PAR WITH OTHER INFRASTRUCTURE INVESTMENTS

Electricity grids

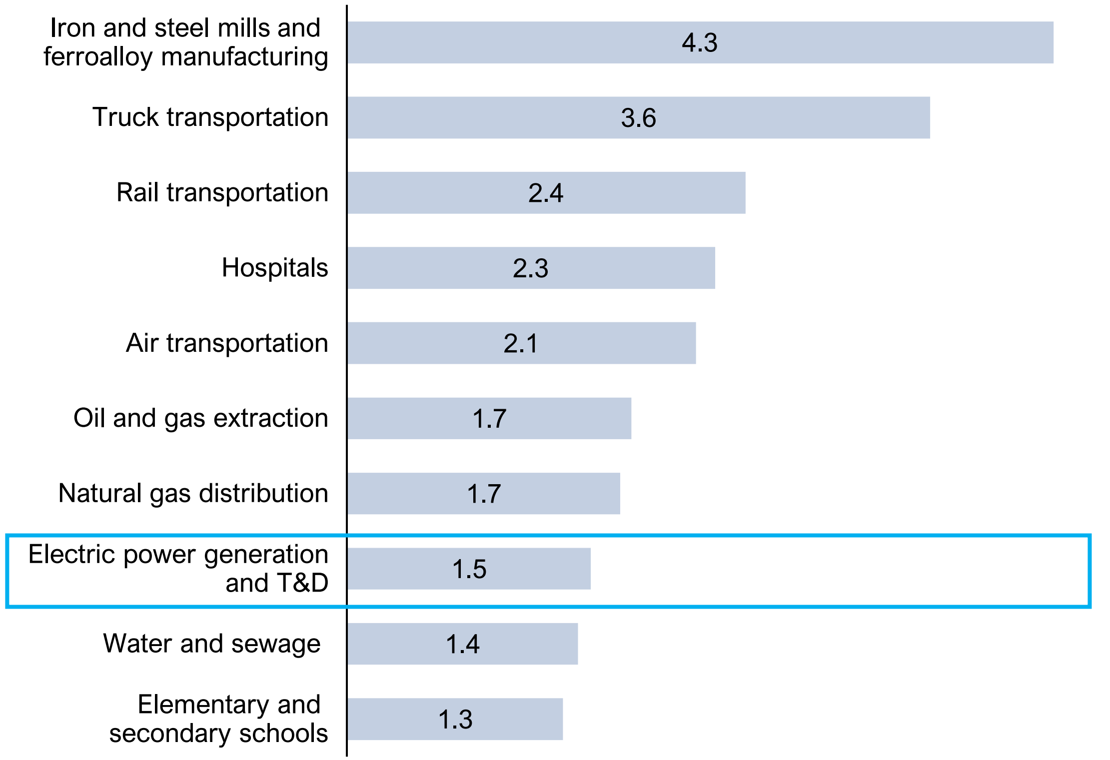
UK electricity multiplier is relatively high compared to other sectors

Type I GVA multipliers (direct and indirect), UK, selected industries, 2022



US electricity multiplier is relatively low compared to other sectors

Type I GVA multipliers (direct and indirect), US, selected industries, 2017



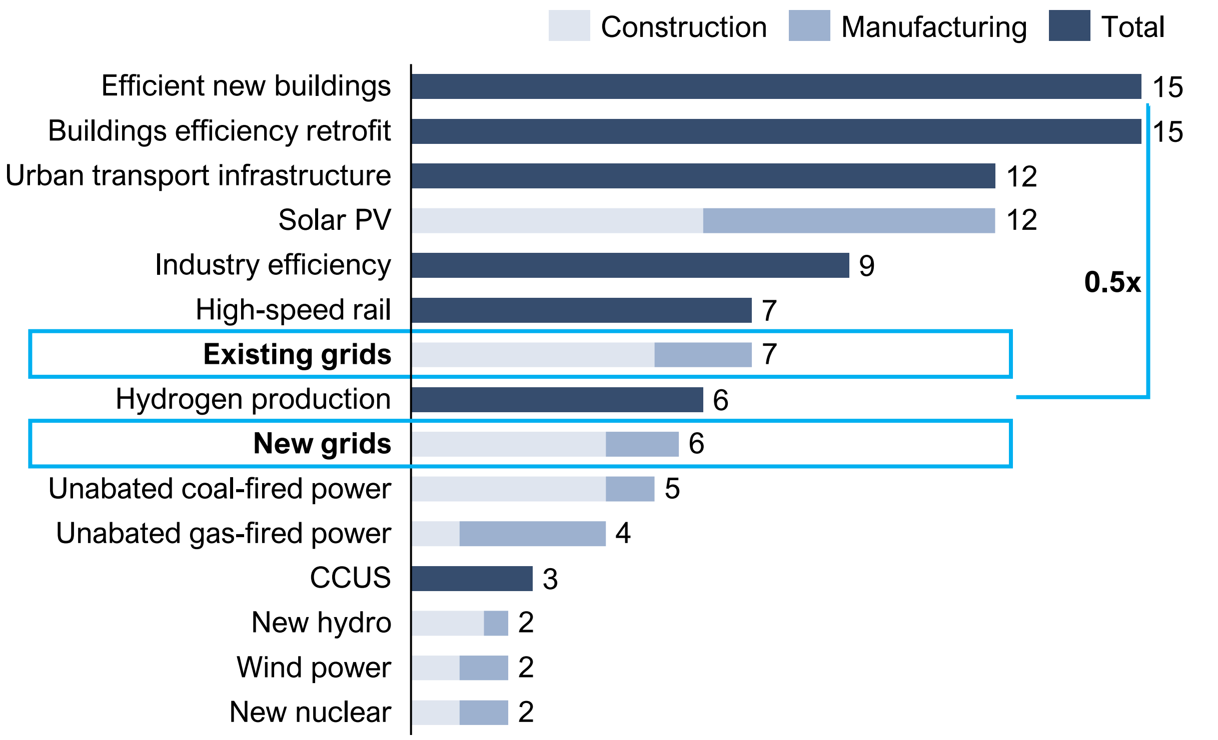
Note: Other sectors are chosen which typically would compete with electricity generation and distribution for public infrastructure investment.
Source: ONS input-output tables; SSEN (2023) *Economic Impact of SSEN Transmission's capital investment programme;* Bureau of Economic Analysis Input-Output accounts

3.2. ELECTRICITY GRIDS EMPLOYMENT MULTIPLIERS ARE APPROXIMATELY HALF THE SECTORS WITH THE HIGHEST MULTIPLIERS

Electricity grids

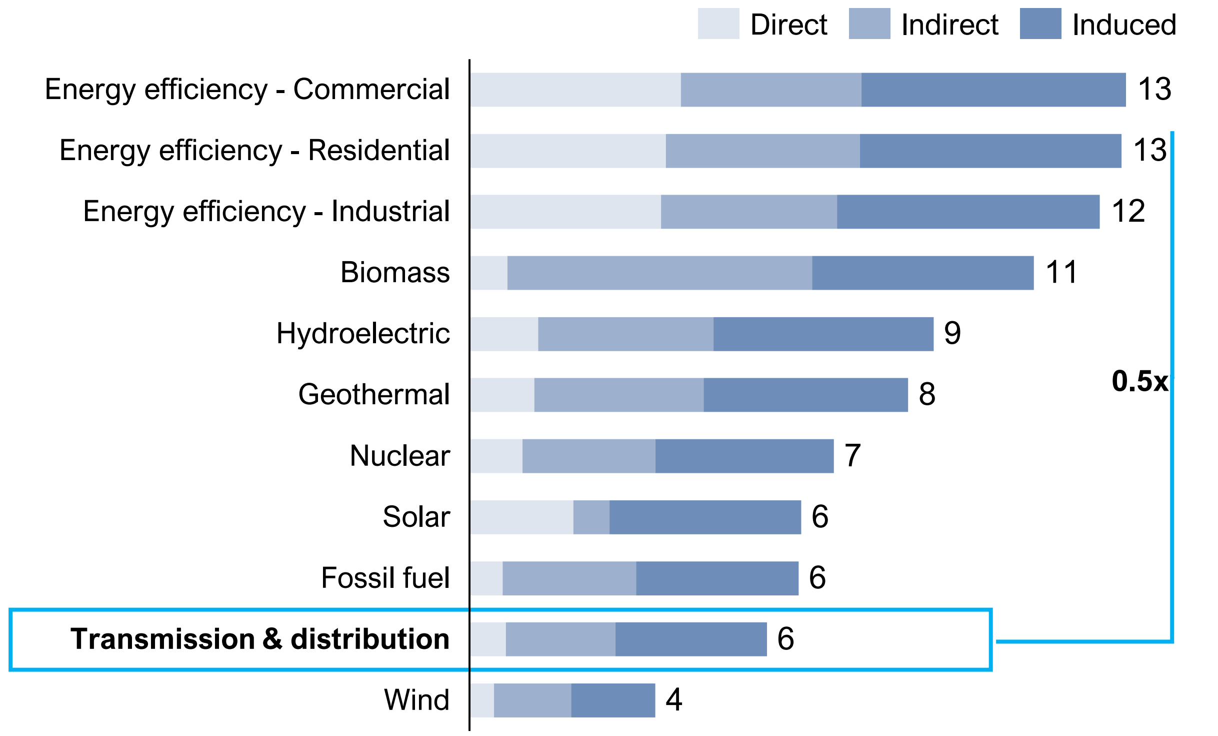
Grid employment multipliers are in the middle of the range compared to other energy investments, according to IEA estimates

Construction and manufacturing jobs created per million dollars of capital investment and spending by measure



Grid employment multipliers are low compared to other energy investments, according to a US-focused study

Construction and manufacturing jobs created per million dollars of capital investment and spending by measure



Note: Studies comparing multipliers between energy investments using GVA or income multipliers were not identified.
Source: Brown, Sony and Li (2020) *Estimating employment from energy-efficiency investments*. IEA (2020) *Sustainable Recovery*.

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4. WHILE GVA CAPTURES SHORT-TERM ECONOMIC IMPACTS, ELECTRICITY GRIDS INVESTMENT DELIVER A WIDE RANGE OF BROADER BENEFITS

Overview of important benefits of investing in electricity grids

Benefit category	Benefits	Sub-benefits
1 Direct economic	1.1 Short-term multipliers, e.g., Gross Value Add (GVA)	Direct impacts (investment spend)
		Indirect impacts (supply chain impacts)
		Induced impacts (impacts due to greater spending by employees employed due to direct and indirect impact)
	1.2 Enabling economic development	Increased productivity due to greater reliability of power
		Improved investment incentives
		Improved incentives for entrepreneurship
		Increased equality between regions and between neighbouring countries due to electricity flows
	1.3 Lower system costs and reduced power prices	Reduced congestion and balancing costs
		Reduced expenditure on imported fossil fuels due to integration of renewables
		Increased number of generation assets can be connected – competition reduces power prices
	1.4 Energy access	Connection of new power generation assets
		Greater utilisation of existing power assets
2 Indirect economic and non-economic	2.1 Energy security and resilience	Reduced reliance on imported fossil fuels, which generate geopolitical vulnerabilities, due to integration of renewables
		Enhanced resilience from a ‘meshed’ grid compared to a ‘radial’ grid, as there are rerouting options in case of failures
		Reduced reliance on single domestic generation sources
	2.2 Wellbeing	Improved health and education outcomes through electricity access
		Improved access to communications services, internet, and electrical appliances
	2.3 Sustainability	Electrification of the economy through switching from fossil-based demand to electrified processes
		Integration of renewables through switching from fossil-based electricity generation
		Reduced air pollution

As discussed on previous pages (1.1)

Source: Expert input; Systemiq analysis.

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5. MANY OF THESE BENEFITS ARE RECOGNISED IN INFRASTRUCTURE STUDIES, BUT NO REVIEWED STUDY QUANTIFIES ALL OF THE BENEFITS

Ticks indicate that the study includes quantitative estimation of that benefit

	Govts/ system operators/ grid operators				Studies by research organisations				Studies by consultants			
Benefits	**NESO, 2024**	**ENTSO, 2024**	**SSEN, 2019**	**Dep. of Energy, 2023**	**World Bank, 2019**	**World Bank, 2008**	**IEA, 2017**	**IEA, 2016**	**KPMG, 2025**	**BCG, 2024**	**Brattle Group, 2021**	**Brattle Group, 2019**
1.1 Short-term multipliers, e.g., Gross Value Add (GVA)			✓									
1.2 Enabling economic development					✓	✓				✓		
1.3 Lower system costs and reduced power prices		✓	✓	✓				✓	✓	✓		✓
1.4 Energy access				✓				✓				✓
2.1 Energy security and resilience	✓	✓	✓				✓				✓	✓
2.2 Wellbeing					✓	✓	✓					
2.3 Sustainability		✓	✓	✓		✓	✓			✓		✓

5. THERE ARE BEST PRACTICE METHODS TO ESTIMATE THE BROADER BENEFITS OF GRIDS INVESTMENT

Benefits	Best practice estimation methods	Example source
1.1 Short-term multipliers, e.g., Gross Value Add (GVA)	Determine GVA impacts through categorising spending into devex, capex and opex, applying a local content proportion, and then calculating using regional input-output tables	SSEN, 2019
1.2 Enabling economic development	Estimation change in productivity resulting from electrification	World Bank, 2008
	Estimation change in level of firm investment resulting from electrification	World Bank, 2019
	Estimation change in business formation resulting from increased grid reliability	World Bank, 2008
	Estimation reduction in regional income inequality resulting from increased electricity access	IEA, 2017
1.3 Lower system costs and reduced power prices	Quantifying the reduction in electricity losses that might otherwise arise without grid build out	SSEN, 2019
	Estimating the cost of avoided gas imports from additional renewable integration	ENTSO, 2024
	Estimate the reduction in consumer electricity prices that will result from the enhanced competiton	Brattle, 2019
1.4 Energy access	Estimate the capacity that can be connected as a result of the grid development and the associated capex spend	KPMG, 2025
	Estimate how the increased utilisation of renewable assets enables deferral of generation investment	Brattle, 2019
2.1 Energy security and resilience	Estimate the reduction in reliance on gas power during periods of low renewable generation	NESO, 2024
	Estimate the cost savings resulting from reduced electricity imports and operation of generation sources from a meshed grid	Brattle, 2021
	Estimate the reduction in constraints/ outage related payments due to grid development (these payments occur when the grid is unable to transmit power to demand locations)	SSEN, 2019
2.2 Wellbeing	Estimate change in school attendance in households with electricity access	World Bank, 2008
	Estimate impact of electrification on mobile phone ownership and internet access	IEA, 2017
2.3 Sustainability	Estimate the impact of grid investment on electrifying heat and transport sectors	ENTSO, 2024
	Quantify the amount of renewable capacity in the interconnection queue that could be brought online through grid development	Dep of Energy, 2023
	Estimate the reduction in emissions due to displaced fossil power, which results from a reduction in renewables curtailment	IEA, 2016

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6. GRIDS INVESTMENTS COULD BE PROMOTED THROUGH MORE COMPREHENSIVE AND CONSISTENT MEASUREMENT OF BENEFITS

- In general, more studies and impact assessments that **quantify the full range of benefits will strengthen the case for investment into electricity grids**.
- Governments, grid operators and research organisations can work towards **common methodological approaches** to evaluate the impact grid investments. This could involve a quantification of all of the benefits, conversely, assessing the costs of inadequate grid build-out — illustrated by a Dutch study estimating the economic and climate damages from grid congestion — to underscore the grid's pivotal enabling role.
- A potential next step would be studies that set out holistic quantitative estimates of all the benefits of grid investment, e.g.,
  - A thorough literature review of all existing methodologies and the development of a core methodology
  - A study that **quantifies all the benefits of the grid for a region with good data availability**
  - **A study that proxies the benefits of the grid in a region with poor data availability.**
- **Longer term, the development of a database to pool key metrics per country and the development of a series of grid archetypes could be helpful,** especially when a country is looking for proxy estimates.
- This could strengthen the case for governments to pursue new funding routes for grids, e.g, allocating some of the funding associated with the recent **NATO target to spend 1.5% of GDP by 2035 on critical infrastructure and networks.**

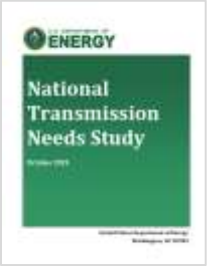
Source: Systemiq analysis for the Energy Transitions Commission; BCG (2024) *Solving the gridlock: Six interventions to accelerate congestion relief on the Dutch electricity grid;* Expert interviews.

OVERVIEW OF SOURCES USED FOR MEASURING BENEFITS OF GRIDS

NESO (2024), *Future Energy Scenarios*

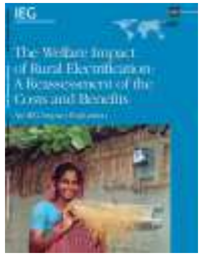
ENTSO (2024), *Ten-Year Network Development Plan*

Scottish & Southern Electricity Networks (2019), *Cost Benefit Analysis Methodology*



US Department of Energy (2023) *National Transmission Needs Study*

World Bank (2019), *Electricity Access in Sub-Saharan Africa*



World Bank (2008), *The Welfare Impact of Rural Electrification*

IEA (2017) *World Energy Outlook 2017: Energy Access Outlook*

IEA (2016) *Next Generation Wind and Solar Power*

KPMG (2025), *Infrastructure Private Capital Study: An analysis of the private capital catalyzed by recent investments in Canadian infrastructure*

BCG (2024) *Solving the gridlock: Six interventions to accelerate congestion relief on the Dutch electricity grid*

Brattle Group (2021), *The Benefit and Cost of Preserving the Option to Create a Meshed Offshore Grid for New York*

Brattle Group (2019), *The Benefits of Electric Transmission: Identifying and Analyzing the Value of Investments*

SUPPLEMENTARY GRID CONTEXT

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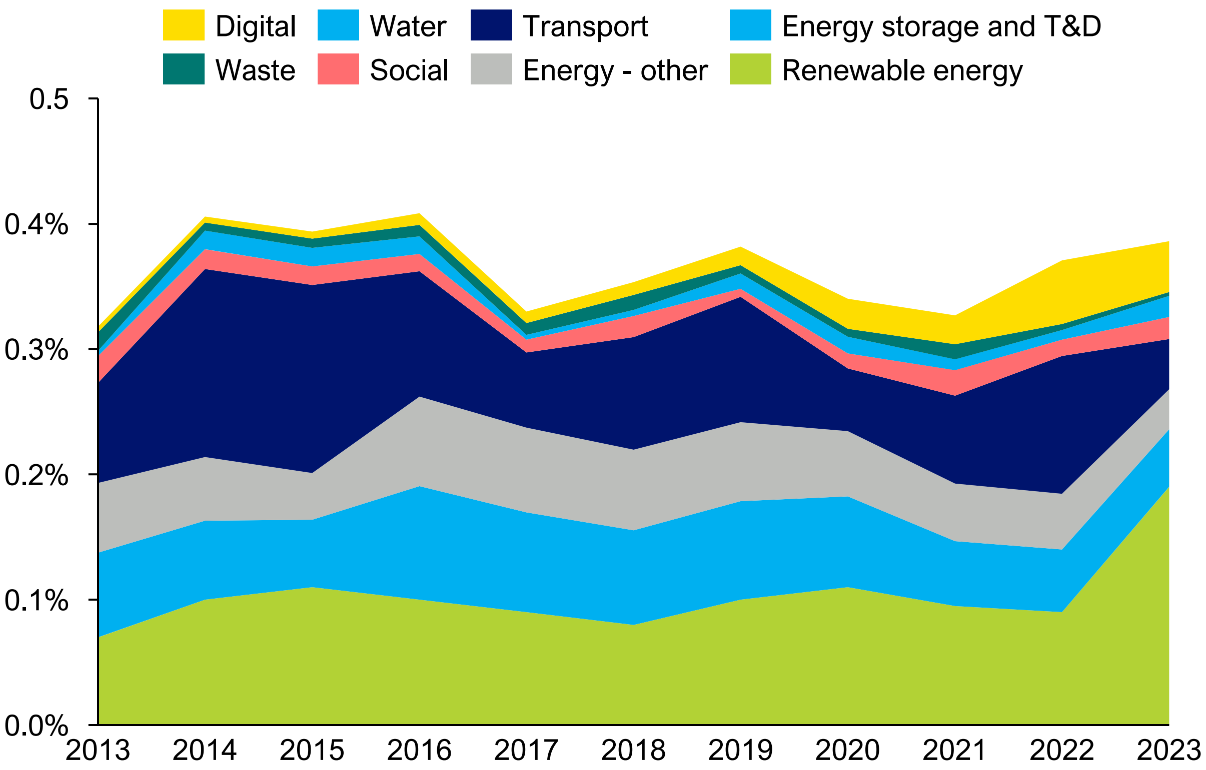
ANNUAL GLOBAL INFRASTRUCTURE INVESTMENT HAS REMAINED RELATIVELY CONSTANT AS A % OF GDP OVER THE PAST ~10 YEARS

Private investment has remained around 0.3% of GDP, with the share of renewable energy increasing

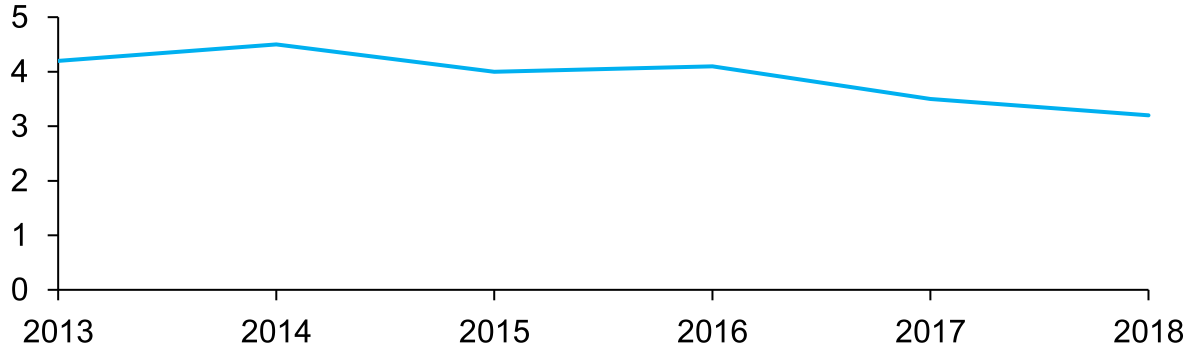
Private markets global infrastructure investment, % of GDP



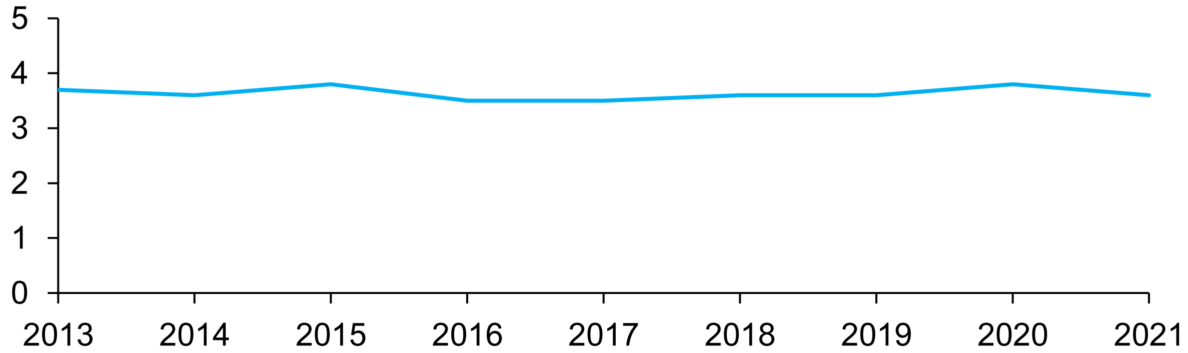
Private investment has remained around 0.3% of GDP, with the share of renewable energy increasing

Public investment[1], % of GDP

Low and middle income countries[2]



OECD countries, median



Note: 1. Used as a proxy for public investment in infrastructure, as most investment is generally in infrastructure. | 2. China and India excluded
Source: World Bank (2025) *Infrastructure Monitor 2024*; IPPR (June 2023) *Now is the time to confront UK's investment-phobia*; World Bank (2022) *Understanding Public Spending Trends for Infrastructure in Developing Countries*

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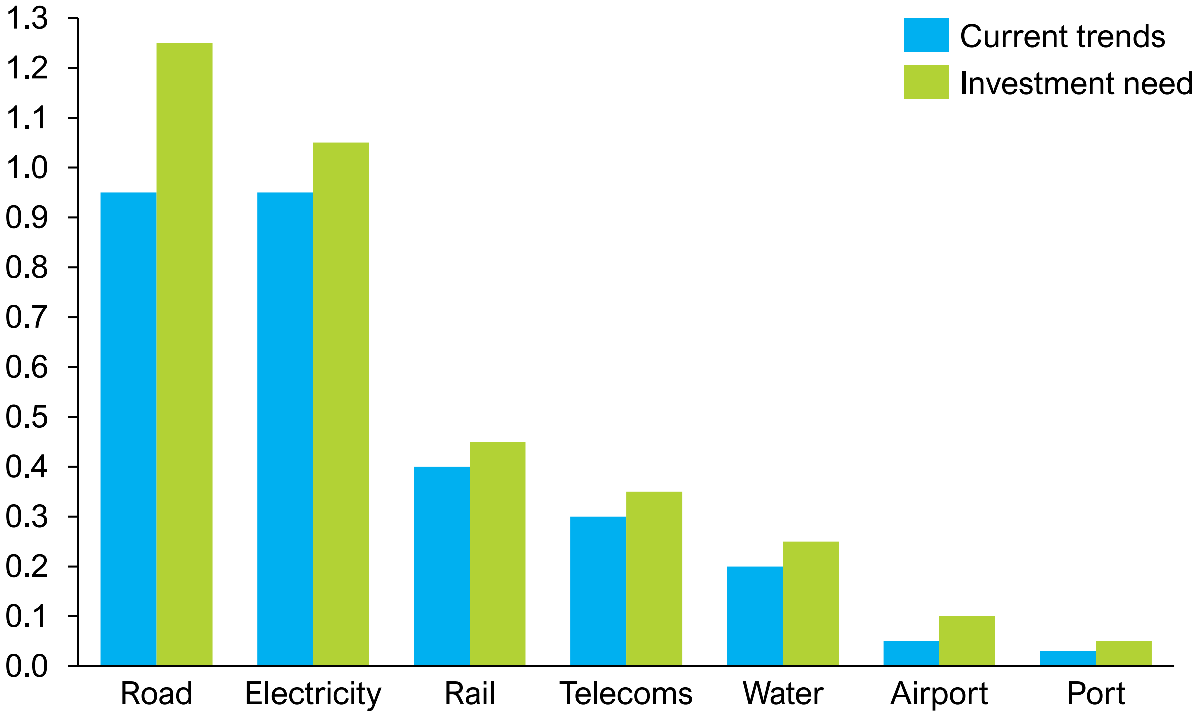
SPEND ON ELECTRICITY INFRASTRUCTURE IS ONE OF SEVERAL AREAS OF REQUIRED INFRASTRCTURE INVESTMENT

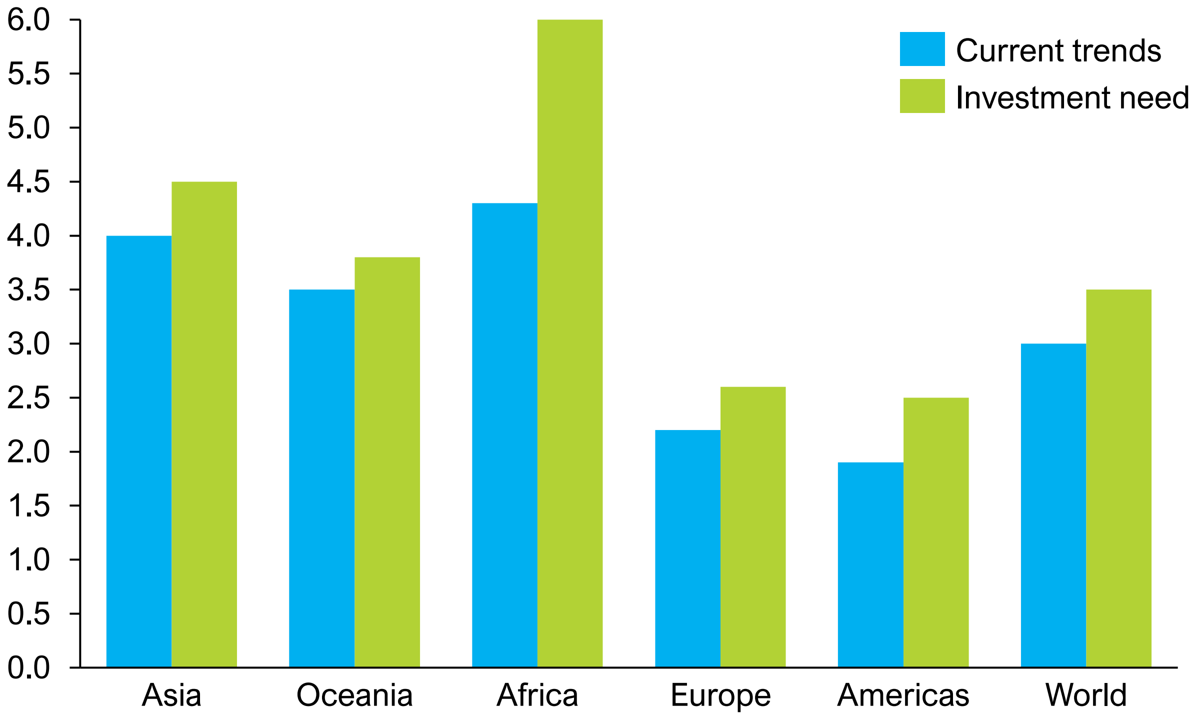
The required infrastructure investment over the coming 10-20 years is greater than what countries are forecast to invest

Global infrastructure spending by sector 2016-40, % of GDP



Regionally, the largest mismatch between projected and required investment is for Africa

Global infrastructure spending by region 2016-40, % of GDP



Note: Current trends – growth occurring only in response to changes in each country's economic and demographic fundamentals. Investment need - investment that would occur if countries were to match the performance of their best performing peers, after controlling for differences in the characteristics of each country

Source: Oxford Economics and Global Infrastructure Hub (2017) *Global Infrastructure Outlook*

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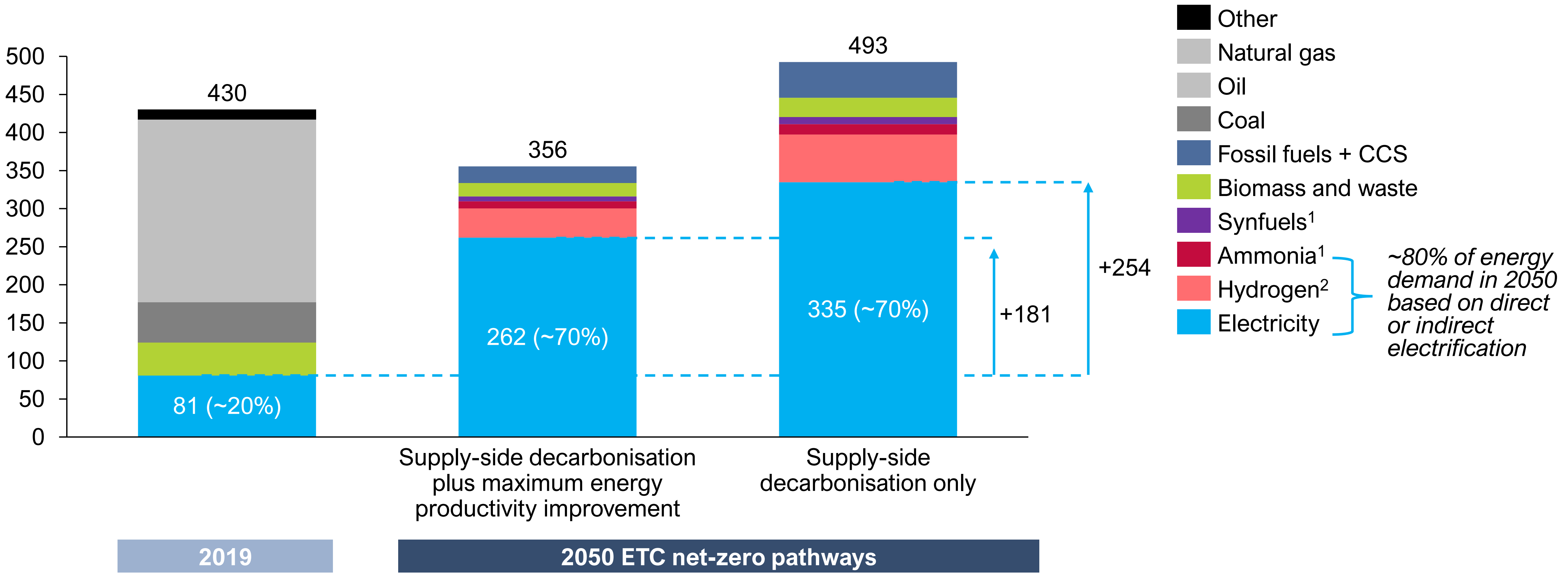
ELECTRICITY GRIDS HAVE A FOUNDATIONAL ROLE IN THE ENERGY TRANSITION (1/3)

The share of electricity in final energy demand is projected to increase from ~20% to ~70%

Final energy demand, EJ/year



Note: 1. Also partially reliant on electricity as synfuels and ammonia are made from green hydrogen, which relies on renewable electricity. | 2. This is primarily reliant on electricity, as most H2 consumed in net zero pathways is likely to be green H2 based on renewable power, rather than blue or grey H2.

Source: Energy Transitions Commission (2021) *Making Clean Electrification Possible: 30 Years to Electrify the Global Economy*.

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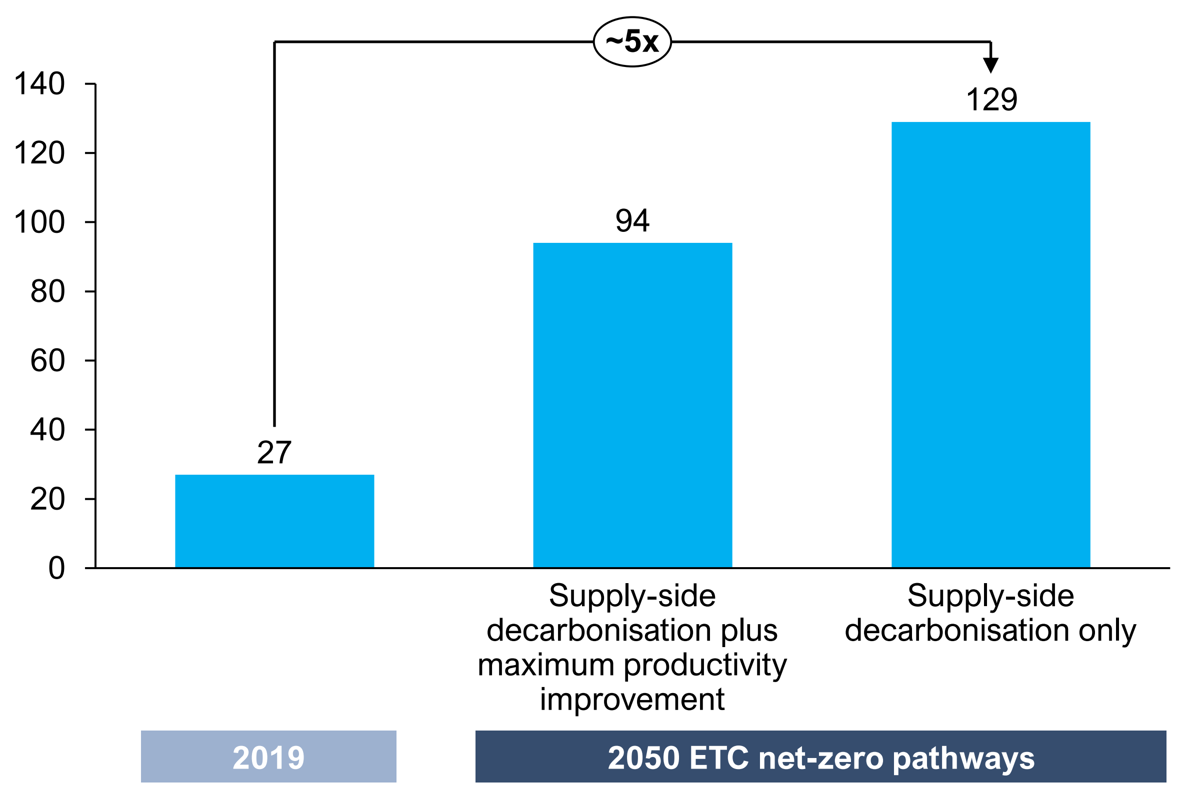
ELECTRICITY GRIDS HAVE A FOUNDATIONAL ROLE IN THE ENERGY TRANSITION (2/3)

Global electricity supply is projected to increase 5x

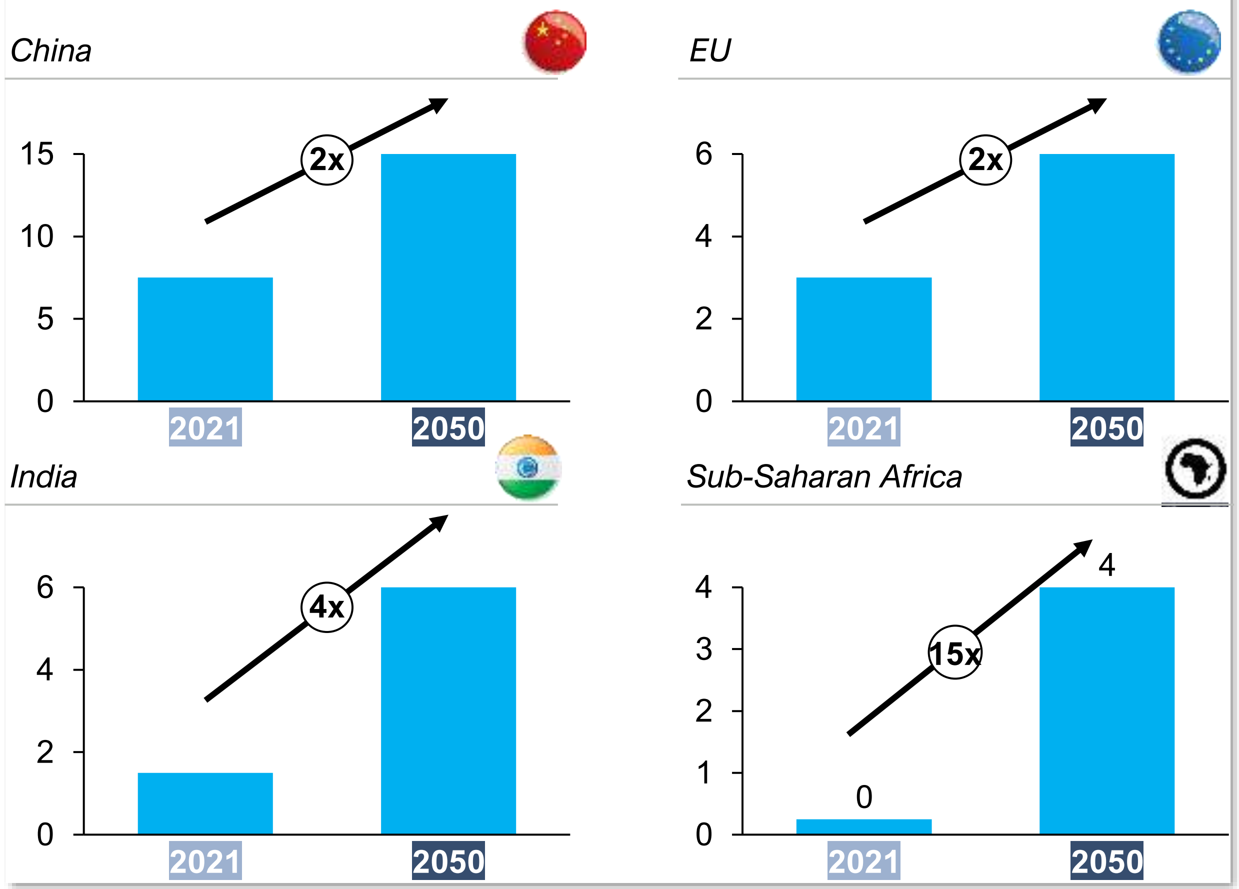
Global electricity generated could be 5x larger in 2050 compared to today in a net zero scenario

Global total electricity generated, 000 TWh/ year



Regional increases in electricity generated range from 2x to 15x between today and 2050

Total electricity generated, 000 TWh/ year



Energy Transitions Commission (April 2021) *Making Clean Electrification Possible: 30 Years to Electrify the Global Economy*; Energy Transitions Commission (November 2023) *Fossil Fuels in Transition: Committing to the phase-down of all fossil fuels*

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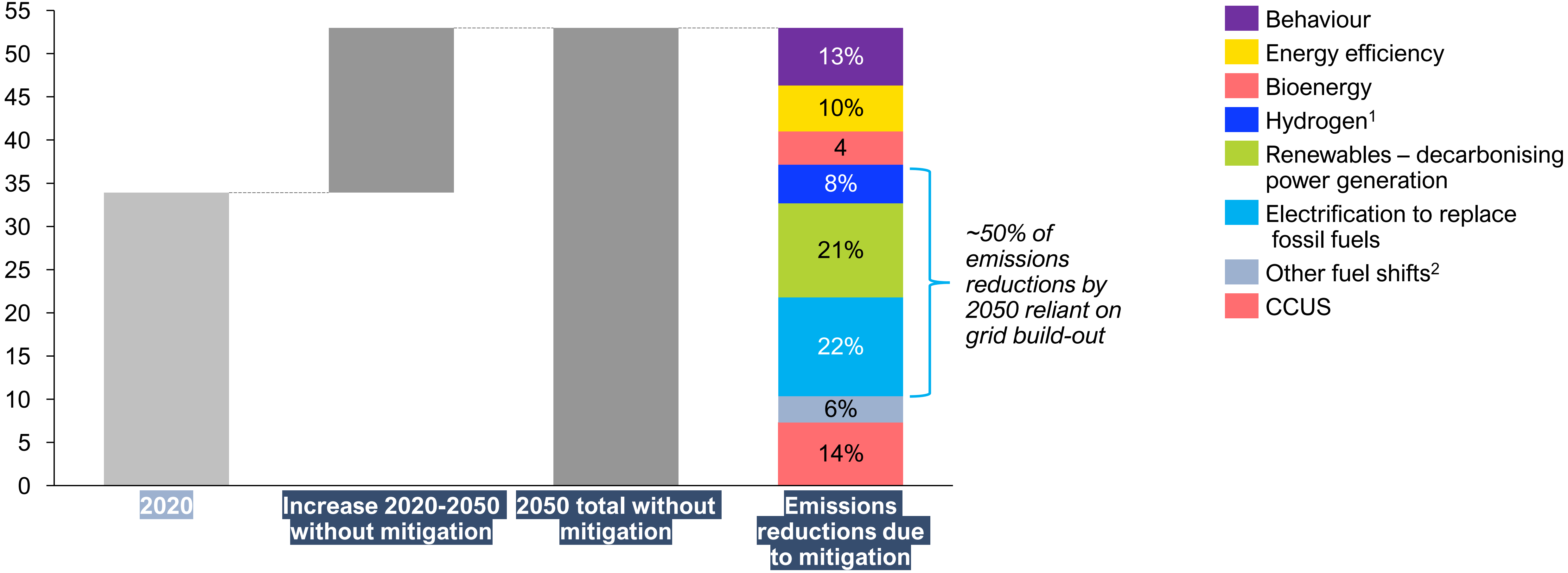
ELECTRICITY GRIDS HAVE A FOUNDATIONAL ROLE IN THE ENERGY TRANSITION (3/3)

Decarbonising power and direct and indirect electrification to replace fossil fuels drives ~50% of required emissions reductions

Energy-related emissions and emissions reduction by mitigation measure in Net Zero by 2050 scenario, GtCO2



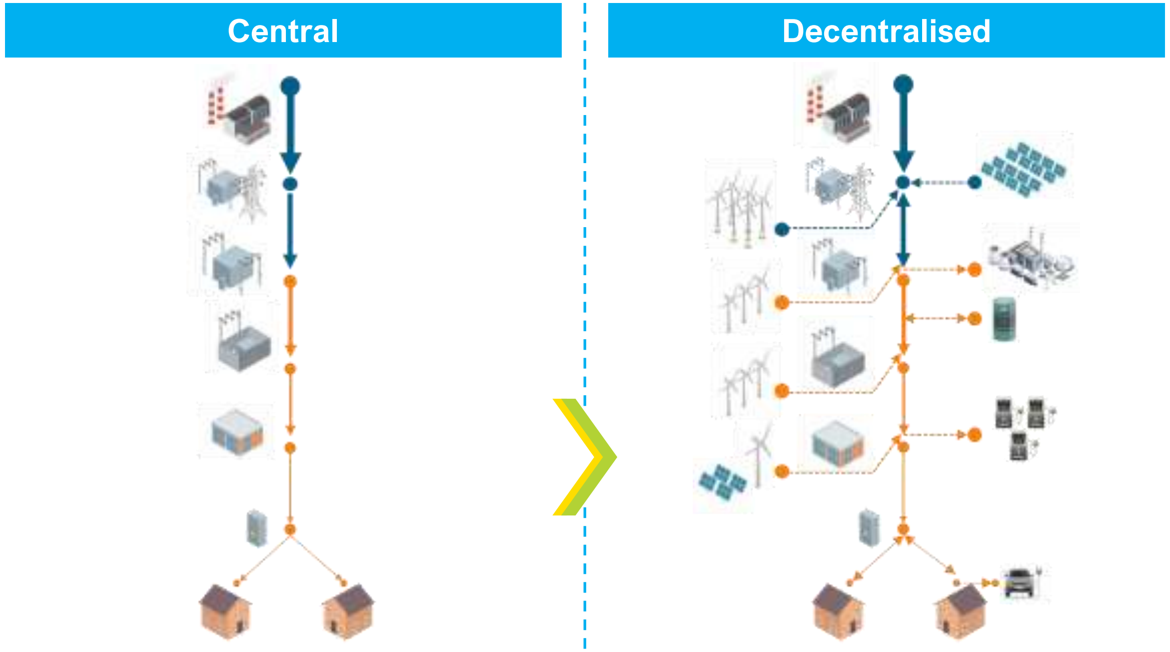
Note: 1. Reliant on grid, as most H2 consumed in 2050 is likely to be green H2, and most of that is likely to be through on-grid renewable electricity. | 2. Also partially reliant on electricity as synfuels and ammonia are made from green hydrogen, which relies on renewable electricity.

Source: IEA (2021) *Net Zero by 2050: A Roadmap for the Global Energy Sector*.

SYSTEMIQ

THE TRANSITION TO A MORE DECENTRALISED, RENEWABLES-DOMINATED POWER SYSTEM NECESSITATES GRID BUILD-OUT

A growing share of electricity is being generated decentrally, which requires more transmission capacity and connections



Central

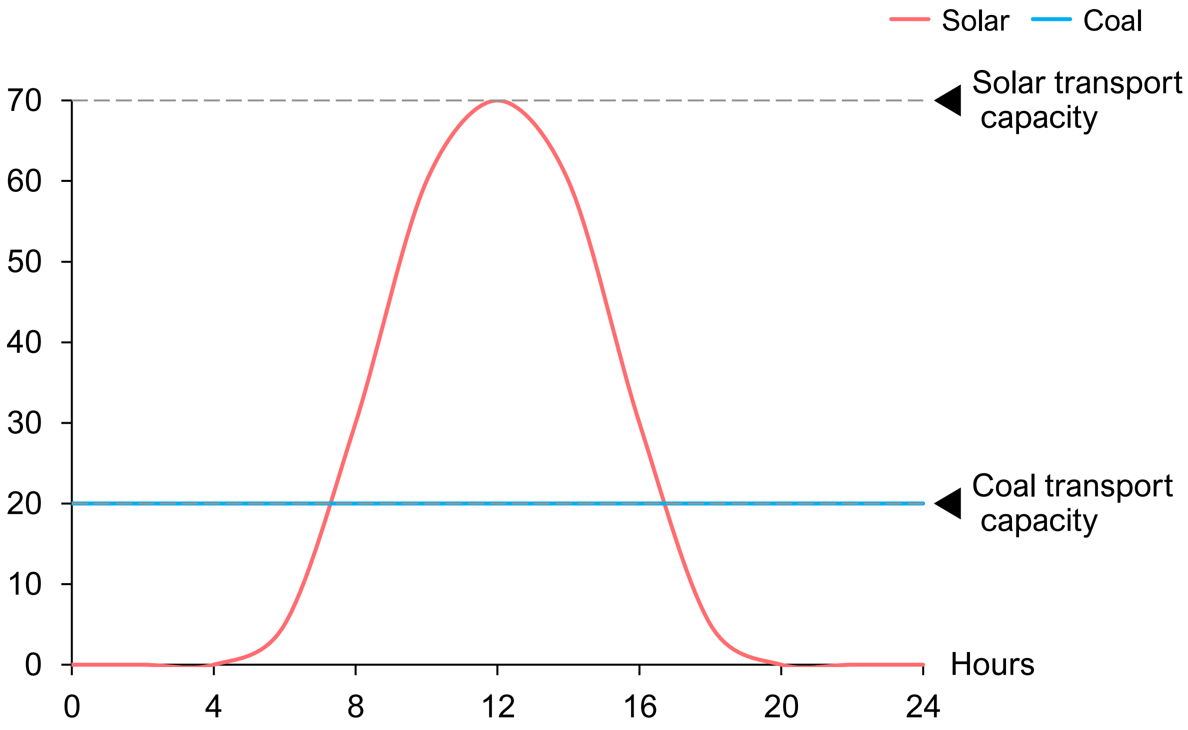
- Transmission capacity is used efficiently
- Power flows in one direction

Decentralised

- New transmission capacity is needed in locations with historically weak grids
- Power flows in both directions
- More kilometers of cable are required per MWh of production

Renewable generation requires more transport capacity compared to baseload generation

Example daily profile for solar and coal with equal generation, MW



Source: Netbeheer Nederland.

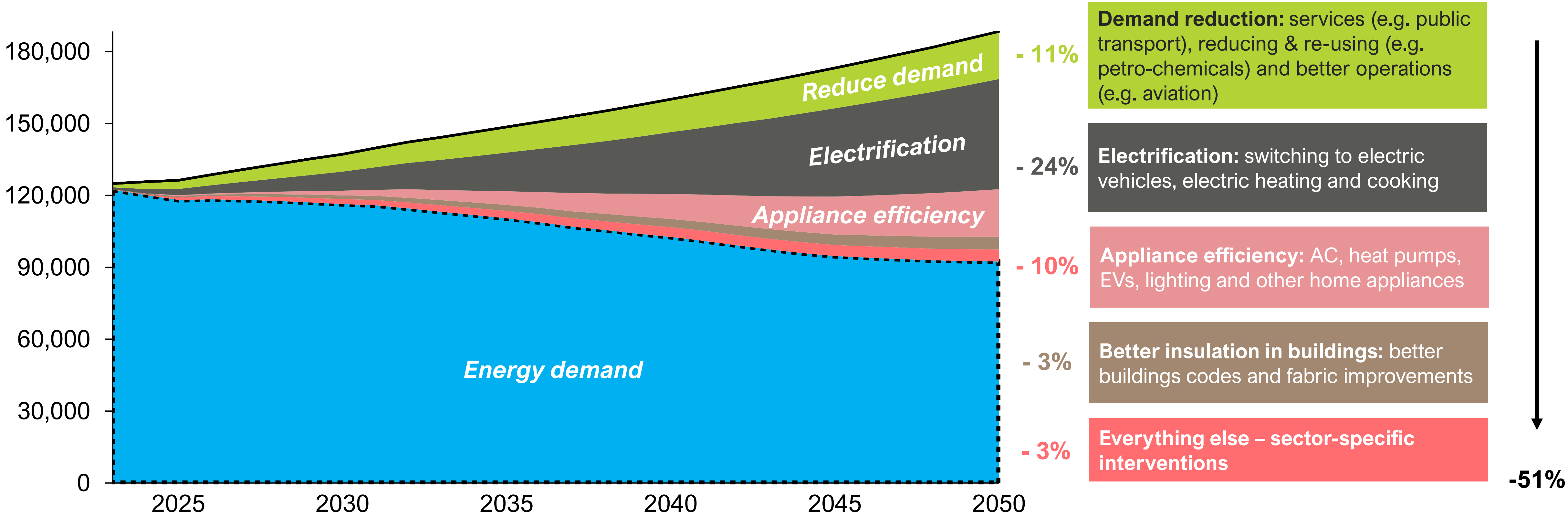
SYSTEMIQ

ELECTRIFIED ENERGY SYSTEMS ARE MORE EFFICIENT, AS ELECTRIFICATION CAN REDUCE FINAL ENERGY DEMAND BY ~25% BY 2050

Grid build-out is a necessity for developing an electrified energy system, which is more efficient and often lower cost

Final energy demand vs productivity levers, TWh

Key actions



Final energy demand will be up to ~50% lower in a 2050 net zero scenario, with half of that reduction coming from electrification

Source: IEA (2025) *World Energy Outlook*; MPP (2023) *Hard-to-Abate Sector Transition Strategies*; ETC (2025) *Achieving Zero-Carbon Buildings*; Energy Transitions Commission (2023), *Fossil Fuels in Transition*; BNEF (2023) *Vehicle Outlook*; Systemiq analysis for ETC.

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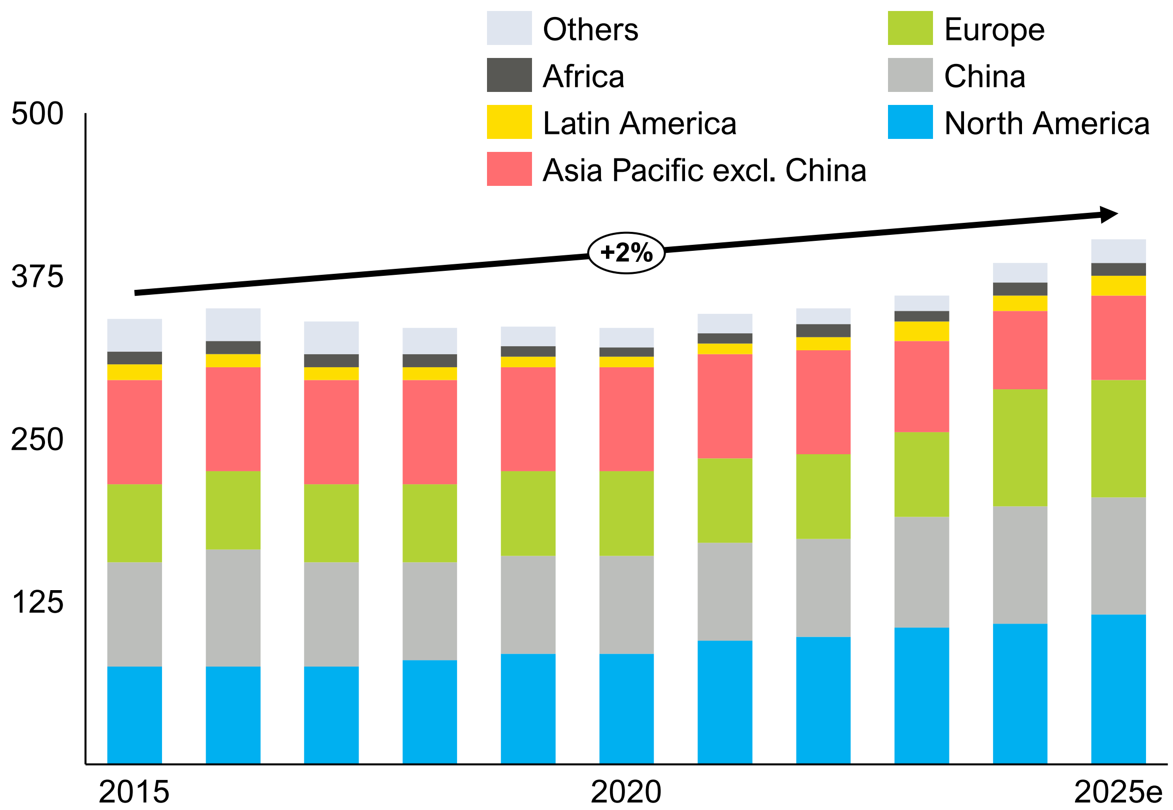
INVESTMENT IN GRIDS HAS BEEN GROWING AT 2%, BUT THERE IS A RISK THE BUILDOUT WILL NOT INCREASE TO THE RATE REQUIRED

Investment in grids has been growing at 2% per year

Investment in power grid infrastructure and share that is digital, 2015-2025, bn USD (2024)



But growth needs to be faster, and investment is facing several headwinds

- In several countries, grid growth need to increase significantly, e.g.
  - UK: National Grid estimates that 5x as much transmission will need to be built in the next 12 years than the past 30
  - EU: required buildout needs to happen 20x faster for the transmission network and 3x faster for the distribution network compared to past buildout rates
- This is due to several headwinds:
  - Planning and permitting delays – whilst construction takes 1-2 years, permitting can take ~8 years
  - Regulatory and policy uncertainty – transmission operators may lack a clear signal from grid operators/ governments regarding the expected renewables and grid build-out
  - Constraints on investment spending – as investments are funded either through consumer bills as grids are regulated assets, or governments, in the case of public utiltiies
  - Supply chain challenges increasing costs and lead times for grid components, e.g., transformers

Source: IEA (2025) *World Energy Investment 2025*; Energy Transitions Commmission (2024) *Building grids faster: the backbone of the energy transition*

INVESTMENT IN GRIDS COULD BE KICKSTARTED BY IMPLEMENTATION AND POLICY PRIORITIES

Overview of priorities

1. **Revising regulatory frameworks to enable anticipatory investment**, by extending planning horizons, spreading the costs of network upgrades more broadly, and allowing greater tolerance for upfront investment risk. The recent NATO commitment to spend 5% of GDP on defence by 2035 includes 1.5% of GDP "to protect critical infrastructure, defend networks, ensure civil preparedness and resilience" – some of this amount could be allocated to government investment in electricity grids.

2. **Strategic spatial planning that sets clear strategies for decarbonisation and electrification**, which identify and encourage the need for grid investment in anticipation of demand growth but also ensure that demand growth rapidly follows to utilise grid capacity, reducing the cost of grid services per kWh. For example, only three EU countries currently fully incorporate EU climate goals into grid investment plans.

3. **Designing regulatory approaches to support early deployment of innovative grid technologies (IGTs) which can reduce both the cost and disruption of infrastructure development.** Prioritising IGTs in the short term, alongside strategic system planning, enables operators to gather real-world data and better understand grid constraints.

4. **Developing power market designs and system planning approaches that reflect the interdependence between locational decisions and grid investment needs is essential.**

5. **Maximising the potential for demand side flexibility by facilitating the development of time of day pricing.**

6. **Streamlining planning and permitting systems to allow faster development of major new grid infrastructure developments**, while seeking social acceptance via use of IGTs to reduce scale of new build where possible and improved pylon designs.

7. **Identifying potential supply chain constraints, which could slow the pace and increase the cost of grid expansion and developing targeted public policy actions** (e.g., development bank finance for new investment) which could overcome these.

Source: Systemiq analysis for the Energy Transitions Commission; Expert interviews.

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